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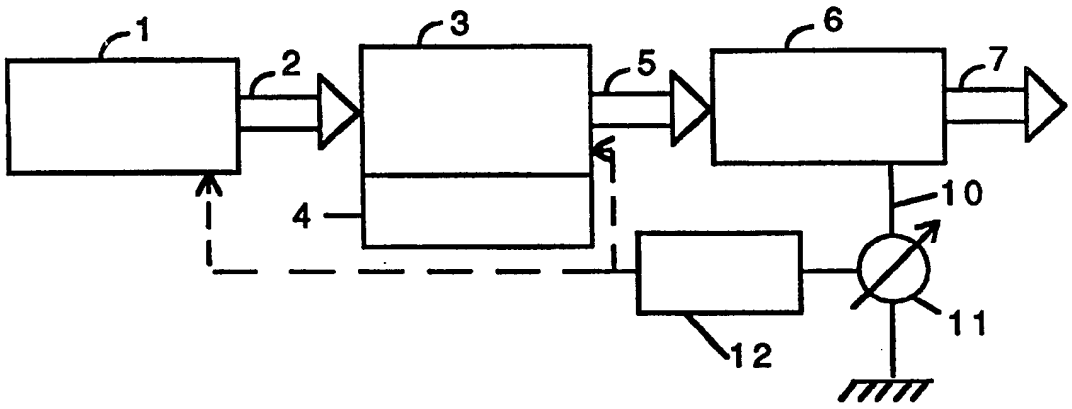
(54) Title: METHOD AND DEVICE FOR APPLICATION OF FIBRES ON A SURFACE



(57) Abstract

The invention refers to a method and a device for application of fibres on a base. The probelm that is solved by the present invention is to charge and convey fibres to a surface, on which the fibre is going to be applied, without need of using electrically powered units to generate a high voltage. This is carried out by friction charging of the fibre. This is achieved by using differences in electro-negativity between two materials. The application equipment includes a charging tube (8), through which the fibre is driven. The inside of the charging tube (8) consists of a dielectric material (9), for instance PTFE. This material is strongly electro-negative and therefore tears electrons from materials that have less electro-negativity.

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Method and Device for Application of Fibres on a Surface.

State of the art:

When applying fibres on a base an electrostatic method is frequently used, by which a high voltage is used to charge the fibres and bring them towards a surface. Similar methods are also used to apply powder on a base.

The technical problem:

The problem that is solved by the present invention is to charge and convey fibres to a surface, on which the fibre shall be applied, without need of using electrically powered units to generate a high voltage. The problem to control the supply of fibres is also solved.

The solution:

The problem is solved by friction charging of the fibre. This is carried out by using differences in electro-negativity between two materials. The application equipment includes a charging tube, through which the fibre is driven. The inside of the charging tube consists of a dielectric material, for instance PTFE (polytetrafluorethylene). This material is strongly electro-negative and therefore tears electrons from a material that has less electro-negativity. By controlling and regulating both the amount of material and particle velocity through the charging tube, one may optimize the process regarding to particle charge. The surplus of electrons in the charging tube is evened out by this being made of an electrically conducting material which is earthed via an earth wire. Through this an electric current is flowing which is caused by the electron migration between the dielectric material of the charging tube and the material that is going to be applied. This enables read-out of the charging course by measuring the current in the earth wire.

The application material consists of fibres of various materials. Examples of materials are: Polyamide, Polyester and similar materials. When a fibre becomes charged the charge is bound in its surface. An electrostatic field

originates from the charged surface. The force of the electric field is determined by the amount of charge. In an angular particle such as the fibre, the ends operate as electrodes, which release part of the charge to the environment. Therefore a strongly charged particle will emit part of the charge to the surrounding air, which then will be ionized. This indicates that there is a saturated charge that a particle of a certain shape may carry.

The present invention thus refers to a method of application of fibres on a base, by which the base is provided with an adhesive and the fibres are given an electric charge through friction against a dielectric material and is directed towards the base. The invention also refers to the dielectric material being applied to a surface of conducting material which by means of an earth wire is connected to earth and that the electric current that flows in the earth wire is measured and constitutes a measure of the amount of fibres that has been charged and that this current is used to control the amount of fibres that are added so that this will be the intended. The added fibre quantity thereby can be controlled by means of a dosage device and a fan device.

The invention also refers to a device for application of fibres on a base, which includes at least one surface of a dielectric material against which the fibres are directed by means of a dosage device and a fan device and that the through friction electrically charged fibres are directed towards the base. This can be designed such, that the dielectric material is applied on at least one surface of conducting material which by means of an earth wire is connected to earth and that the electric current that flows through the earth wire is measured and constitutes a measure of the amount of fibres that has been charged and that this current is used to control the amount of fibres that is added by means of the dosage device and the fan device so that the amount will be the intended.

An embodiment of the present invention is shown

diagrammatically in the drawing, in which

Figure 1 shows the basic design of a device according to the invention, and

Figure 2 shows the function of an application nozzle.

As shown in Figure 1 a fan unit 1 is provided to emit an air flow 2 to a dosage device 3 of fibres which can be provided with a container 4 from which the fibres are taken. The dosage device 3 emits a second air flow 5 containing fibres to the application device 6, in which the fibres are charged electrostatically so that a flow 7 of air with charged fibres is emitted. Figure 2 shows that the second air flow 5 with primarily uncharged fibres in the application device are directed towards a surface 9 of for instance a tube shaped part 8 of metal, whereby the surface 9 is coated with PTFE or other material which gives the fibres in the flow 7 electric charge. The part 8 of metal is connected to earth through the earth wire 10, in which the current is measured by the measuring device 11. The value of the measured current constitutes the output value of a control device 12, which in dependence of this and a set desired value emits a control signal to the dosage device 3 and possibly also to the fan 1.

The adhesive that is used in order to make the fibre stick on the base is frequently a two-component resin glue and the fibres are generally synthetic fibres of for instance polyamide. The fibres which may be used for the present invention are however not limited to any special type, but also for instance coal fibres, glass fibres or the like may be used.

The fibre density, by which the application according to the present invention normally is carried out, may be in the range 50-300 fibres per square mm, preferably more than 150 fibres per square mm, with a fibre thickness smaller than 0.1 mm, preferably less than 0.05 mm and a length in the range of 0.5-5 mm, preferably less than 3 mm.

The invention is not limited to the above embodiments but can be varied in different ways within the scope of the claims.

CLAIMS

1, A method for application of fibres on a base, wherein the base is provided with an adhesive and that the fibres are electrically charged by friction against a dielectric material and are directed towards the base.

2. A method according to claim 1, wherein the dielectric material is applied on a surface of a conducting material which is connected to earth through an earth wire, the electric current that flows in the earth wire is measured and forms a measure of the amount of fibres being charged, and this current is used to control the amount of fibres being added to an intended value.

3. A method according to claim 2, wherein the amount of fibres is defined by a dosage device and a fan device.

4. A method according to any of claims 1-3, wherein the length of the fibres is between 0.5 and 5 mm and they are applied with a density in the range of 50-300 fibres per square mm.

5. A device for application of fibres on a base, including at least one surface (9) of a dielectric material towards which the fibres are directed and that the fibres, electrically charged by the friction, are directed towards the base.

6. A device according to claim 5, wherein the fibres are directed towards the surface (9) by means of a dosage device (3) and a fan device (1).

7. A device according to claim 5 or 6, wherein the dielectric material (9) is applied on at least one surface of a conducting material (8) which by an earth wire (10) is connected to earth and that the electric current in the earth wire is measured and forms a measure of the amount of fibres being charged, said electrical current is used to control the amount of fibres being added.

8. A device according to any of claims 5 - 7, wherein the length of the fibres is between 0.5 and 5 mm and they are applied with a density in the range of 50-300 fibres per square mm.

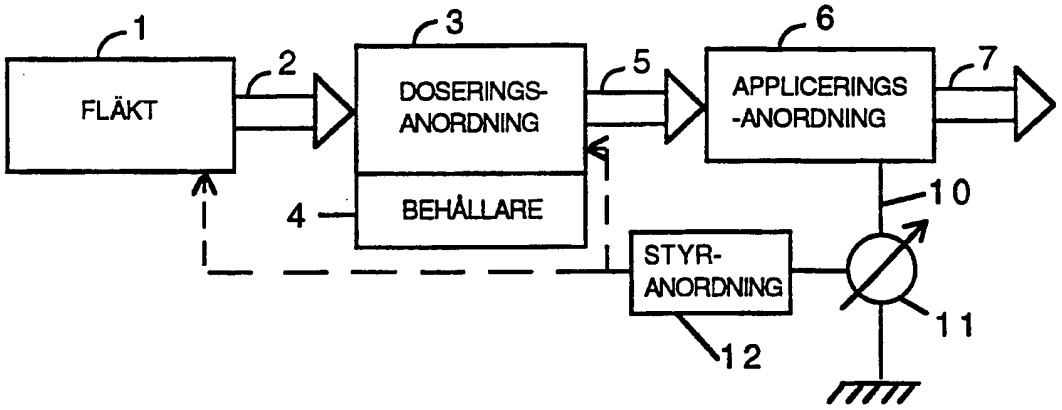
1
FLÄKT
2
3
DOSERINGS-
ANORDNING
4
BEHÅLLARE
5
6
APPLICERINGS
-ANORDNING
7
10
STYR-
ANORDNING
11
12

Fig.1

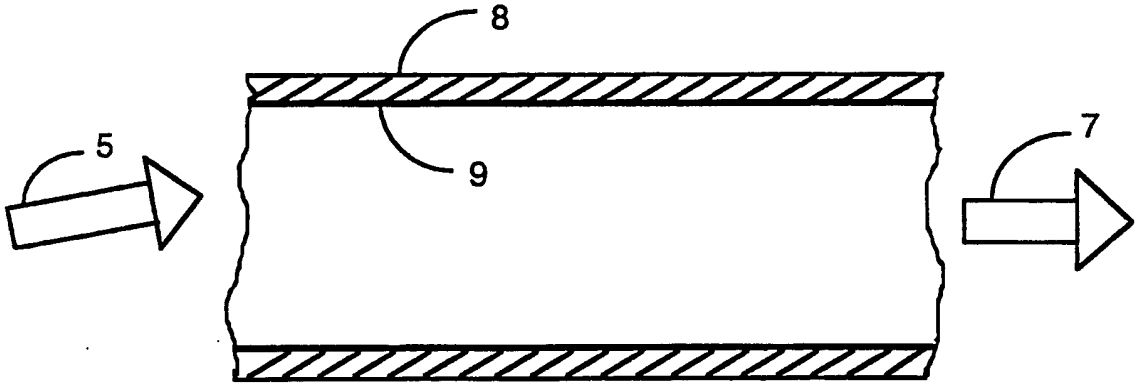
8
5
9
7

Fig.2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/00237

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B05B 5/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B05B, B05C, B05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4879969 (TOMOJI HARANOYA ET AL), 14 November 1989 (14.11.89), claims 1-7, abstract	1
X	US, A, 4031270 (TRACY W. BARNES), 21 June 1977 (21.06.77), abstract	1
A	EP, A1, 0592137 (NORDSON CORPORATION), 13 April 1994 (13.04.94)	1-7

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
12 June 1995	26 -06- 1995
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP, A1, 0627265 (MATSUO SANGYO CO., LTD.), 7 December 1994 (07.12.94) --	1-7

INTERNATIONAL SEARCH REPORT

Information on patent family members

03/05/95

International application No.
PCT/SE 95/00237

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4879969	14/11/89	AU-B- 605776	24/01/91
		AU-A- 7597387	04/02/88
		CA-A- 1300475	12/05/92
		DE-A,C- 3724176	04/02/88
		FR-A- 2601887	29/01/88
		GB-A,B- 2195924	20/04/88
		JP-C- 1796176	28/10/93
		JP-B- 5003349	14/01/93
		JP-A- 63036860	17/02/88
		KR-B- 9310301	16/10/93
		US-A- 4774645	27/09/88
		JP-A- 63065968	24/03/88
US-A- 4031270	21/06/77	NONE	
EP-A1- 0592137	13/04/94	NONE	
EP-A1- 0627265	07/12/94	NONE	